Electrically-Controlled Variable Acidity Adhesive Plastics for Remotely Triggered and/or Time-Delayed Initiation of Corrosive Processes, Particularly in Maritime Environs

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Introduction

Although undersea sabotage operations have a long and storied history, these operations are rarely plausibly deniable. While many types of undersea mines exist, the placement of these mines is often a noisy process, making the mining of a submarine with sophisticated passive sonar capability a near-impossibility. Furthermore, existing mines would be found upon hull inspection. Demand exists for novel mine concepts that have as their attributes silent installation, persistence and undetectability even upon inspection.

A window of opportunity created by other novel technologies now exists for development, manufacture and deployment of specialized mines upon the hulls of submarines that could be remotely triggered both in combat scenarios as well as in "gray" warfare in which strategic assets are sabotaged during peacetime in order to weaken a potential adversary over time.

Abstract

Given that that position and direction of travel of enemy submarines are known, it is possible for a friendly submarine to deploy a circular plastic sheet of perhaps 100 feet in diameter in the path of the enemy submarine that it might adhere to the front hull of the submarine. This plastic would be composed of a viscous material laden with Synthetic Switchable Acid-Like Nanocapacitors (SSALN.)

These nanocapacitors would internally circulate electrons between capacitors which would constantly attempt to charge and discharge, trading off between accepting current and providing it to its neighbors. This exchange of current mimics the mode of action of acids and creates the sort of molecular disorder in an affected surface one would associate with acids. Such a plastic sheet would be able to switch on and off controllably.

During the installation phase, subsequent to impact with the hull of the enemy submarine, the electron exchange function would be activated, causing the plastic sheet to "melt into" the hull of the enemy submarine. Before long, aided by the water pressure of the forward motion of the submarine, the plastic sheet would be entirely incorporated into the hull in such a way that it would evade detection upon hull inspection.

At this point, the electron exchange function would be deactivated before a hull breach resulted from the action of the material. Without the flow of electrons, the material would cease to behave as an acid and the combined iron and adhesive would lie dormant, waiting for the re-activation of the system at a time of the saboteur's choosing.

The depth of initial corrosion would necessarily be limited to a few millimeters lest the hull be compromised immediately during the installation process. Thus, the plastic sheets carrying the nanocapacitant agents would need to be no more than about 0.5mm in thickness.

The plastic would be colored black to match the color of the hull of a submarine, however, an adhesive with the correct properties should be able to maintain adhesion to the existing paint after sinking beneath the paint layer, resulting in the re-consolidation of the original paint over the affected area.

Provided that the use of the system is limited, at least one vessel may be destroyed using this method while maintaining plausible deniability, but importantly, any and all vessels may be primed for destruction in advance of any conflict given space-based sub-detection capability and silent photo-magnetic propulsion of undersea vehicles.

Conclusion

The low cost of prototyping and high potential impact of such a system recommend it for immediate development.